REMARKS

By way of this Amendment, the first paragraph of the specification and claims 1-3, 8, and 14 have been amended. Claim 4 was previously cancelled. Accordingly, claims 1-3, and 5-22 remain present in this application. Applicants respectfully request reconsideration and allowance of the present application.

In the latest Office Action, claims 1-3, 5-10, and 14 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. The Examiner stated that the description of capacitive plates as being radially extended is not supported by the specification or drawings. Applicants have amended claims 1 and 14 to remove "radially" and to recite that the movable capacitive plates extend from an outer perimeter of a central portion of the inertial mass. The aforementioned amendments render the rejection of claims 1-3, 5-10, and 14 under 35 U.S.C. §112, first paragraph, moot.

Claims 1-3 and 5-19 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. With respect to claim 1, the Examiner stated that radially extended is unclear, and further stated that the inertial mass is recited as including a plurality of movable capacitive plates which does not provide proper or clear antecedent basis for the inertial mass recited in claims 2 and 3. Applicants have amended claim 1, as discussed above, to remove the language "radially." Additionally, claims 1, 2, 3, and 14 have been amended to recite that the inertial mass includes a central portion and a plurality of movable capacitive plates, and the central portion of the inertial mass has a substantially annular ring shape in claim 2, and an elliptical shaped ring in claim 3.

The Examiner also stated with regard to claim 11 that the positive-to-negative with respect to the sensing axis is unclear, and that it is not clear whether Applicants intend positive-to-negative to be an electrical or mechanical limitation, and it is not clear how this relates to the sensing axis. Applicants submit that the capacitive coupling is an electrical capacitance, the change of which provides the voltage output V_O (see page 13, lines 23-31). As to the orientation of the capacitive coupling relative to the sensing axis, the specification and drawings clearly show that the capacitive plates are oriented to provide a capacitive

coupling in the X-sensing axis as shown in the drawings. Accordingly, Applicants respectfully request that the rejection of claims 1-3 and 5-19 under 35 U.S.C. §112, second paragraph be withdrawn.

Claims 1, 5-9, 11-15, and 17-19 were rejected under 35 U.S.C. §102(e) as being anticipated by Zerbini et al. (U.S. Patent No. 6,508,124). Applicants respectfully traverse this rejection for the reasons set forth below.

The reference to Zerbini et al. discloses a microelectromechanical structure having a rotor element supported and biased via a suspension structure. The embodiment set forth in FIG. 13 of Zerbini et al. illustrates a linear accelerometer (70) having a pair of seismic masses (71) of a generally rectangular shape extending parallel to and at a distance from each other. The pair of rectangular seismic masses (71) are displaced from a central beam (73) and are connected thereto via four springs (72). The central beam (73) also has a rectangular shape and extends parallel to the seismic masses in a central position (see column 6, lines 24-53).

In contrast, Applicants' claim 1, as amended, recites a linear accelerometer having a substrate, and a fixed electrode supported on the substrate and including a first plurality of fixed capacitive plates. The linear accelerometer also includes an inertial mass substantially suspended over a cavity and including a central portion and a plurality of movable capacitive plates arranged to provide a capacitive coupling with the first plurality of fixed capacitive plates. The inertial mass is linearly movable relative to the fixed electrode. The first plurality of movable capacitive plates extend from an outer perimeter of the central portion of the inertial mass, and the first plurality of fixed capacitive plates are displaced from the central portion of the inertial mass. The accelerometer also has a central member fixed to the substrate and located substantially in a central region of the central portion of the inertial mass, and a plurality of support arms for supporting the inertial mass relative to the fixed electrode and allowing linear movement of the inertial mass upon experiencing a linear acceleration along a sensing axis, and for preventing movement along a non-sensing axis. The linear accelerometer further includes an input electrically coupled to one of either the first electrode and the inertial mass for receiving an input signal, and an output electrically coupled to the other of the fixed electrode and the inertial mass for providing an output signal which varies as

a function of the capacitive coupling and is indicative of linear acceleration along the sensing axis.

In order to anticipate a claim, the reference must teach each and every element set forth in the claim. Applicants submit that the Zerbini et al. reference does not disclose a linear accelerometer as recited in Applicants' claim 1, as amended. This is because Zerbini et al. fails to disclose a linear accelerometer having an inertial mass suspended over a cavity and including a central portion and a plurality of movable capacitive plates extending from the outer perimeter of the central portion of the inertial mass with fixed capacitive plates displaced from the central portion of the inertial mass, and a central member fixed to the substrate and located substantially in a central region of the inertial mass. Instead, the Zerbini et al. linear accelerometer shown in FIG. 13 is a rectangular configured accelerometer employing a pair of spaced rectangular masses, and does not teach or even suggest an inertial mass having a central portion and a central member located substantially in a central region of the inertial mass as set forth in claim 1, as amended. Accordingly, Zerbini et al. does not teach each and every element of claim 1, as amended, and therefore does not anticipate claim 11.

Applicants' claim 11 recites a linear accelerometer comprising a substrate, a first bank of variable capacitors formed on a first plurality of fixed capacitive plates and a first plurality of movable capacitive plates, and a second bank of variable capacitors formed on a second plurality of fixed capacitive plates and a second plurality of movable capacitive plates. The linear accelerometer also includes an inertial mass that is linearly movable in response to linear accelerometer along a sensing axis. The inertial mass is electrically coupled to the first and second plurality of movable capacitive plates and is arranged so that the first and second movable capacitive plates form capacitive couplings with the first and second plurality of fixed capacitive plates. The first movable capacitive plate and first fixed capacitive plate forms a positive-to-negative orientation capacitive coupling with respect to the sensing axis, while the second movable capacitive plate and second fixed capacitive plate form a capacitive coupling having an opposite positive-to-negative orientation with respect to the sensing axis. The opposite positive-to-negative orientations of capacitive coupling formed with the first and second banks of variable capacitors advantageously nulls out rotational cross-axis sensitivities

and linear off-axis sensitivities, and allows for linear acceleration to be sensed along the sensing axis.

It is submitted that Zerbini et al. does not disclose a linear accelerometer having first and second banks of variable capacitors arranged in opposite positive-to-negative orientations of capacitive couplings, as set forth in claim 11. Therefore, Zerbini et al. does not teach each and every limitation of claim 11, and claim 11 is therefore not anticipated by Zerbini et al.

Accordingly, Applicants submit that claims 1, 5-9, 11-15, and 17-19 are not anticipated by the Zerbini et al. patent, and the rejection of these claims under 35 U.S.C. §102(e) should be withdrawn.

Claims 20 and 22 were rejected under 35 U.S.C. §102(b) as being anticipated by Yokota et al. (U.S. Patent No. 5,707,077). Applicants likewise traverse this rejection for the reasons set forth below.

The reference to Yokota et al. teaches a three-dimensional acceleration sensor having a massive part (5) connected to a central part (9) via beams (10). The massive part (5) is movable such that a gap between a stationary electrode (7) formed on a glass plate (2) and the massive part (5) changes with acceleration applied to the face of the massive part (5). Changes in capacitance can be monitored at four corners of the massive part (5) and processed to determine acceleration in any of the X, Y, and Z directions.

Applicants' claim 20 recites a micromachined linear accelerometer having a substrate, a fixed electrode supported on the substrate and including a first plurality of fixed capacitive plates, and a ring having a central opening and including a plurality of movable capacitive plates at the outer perimeter arranged to provide a capacitive coupling with the first plurality of fixed capacitive plates. The ring is suspended over a cavity and is linearly movable relative to the fixed electrode. The linear accelerometer also includes a central member fixed to the substrate and located within the central opening of the ring, and a plurality of support arms extending between the central member and the ring for supporting the ring relative to the fixed electrode and allowing linear movement of the ring along a sensing axis upon experiencing a linear acceleration along the sensing axis. The linear accelerometer further includes an input electrically coupled to one of either the fixed electrode and the ring for receiving an input

signal, and an output electrically coupled to the other of the fixed electrode and the ring for providing an output signal which varies as a function of the capacitive coupling and is indicative of linear acceleration along the sensing axis.

Applicants submit that the reference to Yokota et al. does not disclose a linear accelerometer employing a ring having a central opening and including a plurality of movable capacitive plates at the outer perimeter arranged to provide a capacitive coupling with the first plurality of fixed capacitive plates, with the ring suspended over a cavity and linearly movable relative to the fixed electrode. Instead, Yokota et al. discloses a three-dimensional acceleration sensor having a massive part (5) and beams (10) and diaphragm (6) for interconnecting the massive part to a central part (9). Movement on the massive part causes a change in capacitance, the direction of which can be determined by detecting a change of capacitance between electrodes (7) and massive part (5). The electrodes (7) in Yokota et al. are provided at the four corners of massive part (5) as shown in FIG. 11 (see Column 3, lines 29-31), and clearly are not at the outer perimeter of a ring. Instead, electrodes (7) in Yokota et al. are underneath massive part (5) and are located inward from its outer perimeter, as shown in FIG. 11.

Accordingly, it is submitted that claim 20 is not anticipated by Yokota et al., and the rejection of claims 20 and 22 under 35 U.S.C. §102(b) should likewise be withdrawn.

Claims 2, 3, 10, and 16 were rejected under 35 U.S.C. §103(a) as being unpatentable over Zerbini et al. as applied to claims 1, 5-9, 11-15, and 17-19. Applicants submit that claims 2, 3, 10, and 16 are dependent upon claims which are allowable, as discussed above, and hence these claims should likewise be allowable. Applicants agree with the Examiner that Zerbini et al. lacks specific shapes are recited in the claims. However, Applicant is of the position that the shape of the central portion of the inertial mass into a substantially annular ring shape or an elliptical shaped ring as recited in claims 2 and 3, is a further patentable distinguishment over the Zerbini et al. reference. It is submitted that claims 2, 3, 10, and 16 would not have been rendered obvious to one of ordinary skill in the art at the time of the present invention in view of Zerbini et al., and the rejection of these claims under 35 U.S.C. §103(a) should be withdrawn.

Claim 21 was rejected under 35 U.S.C. §103(a) as being unpatentable over Yokota et al., as applied to claim 20. Applicants are of the position that claim 21 is allowable for the reasons discussed above with respect to independent claim 20, which claim 21 depends from. Accordingly, withdrawal of the rejection of claim 21 under 35 U.S.C. §103(a), is likewise respectfully requested.

By way of the foregoing discussion, Applicants have demonstrated that the claim rejections under 35 U.S.C. §112, first and second paragraphs, should be withdrawn, and that claims 1, 5-9, 11-15, and 17-19, as amended, are not anticipated by Zerbini et al., claims 20 and 22 are not anticipated by Yokota et al., claims 2, 3, 10, and 16 would not have been rendered obvious in view of Zerbini et al., and claim 21 would not have been rendered obvious in view of Yokota et al. Accordingly, it is submitted that claims 1-3 and 5-22, as amended, are allowable, which action is respectfully requested.

The remaining prior art made of record in the present Office Action were not applied to the claims, and thus is not discussed herein. Applicants have reviewed these references and agree with the Examiner that such references do not teach or suggest the claimed invention.

In view of the above remarks, it submitted that claims 1-3 and 5-22, as amended, define patentable subject matter and are in condition for allowance, which action is respectfully solicited. If the Examiner has any questions regarding patentability of these claims, the Examiner is encouraged to contact Applicants' undersigned attorney to discuss the same.

Respectfully submitted,

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